

Review of the Thaumaleidae (Diptera) of South Africa

by

Bradley J. Sinclair¹ and Brian R. Stuckenberg²

(¹Entomology Section, Australian Museum, Sydney South, NSW, 2000, Australia;

²Natal Museum, P. Bag 9070, Pietermaritzburg, South Africa)

ABSTRACT

The male of *Afrothaumalea pamela*e Stuckenberg, 1960, is described and the unnamed specimen of Stuckenberg (1961) is recognised as a different species now named *A. capensis* Sinclair & Stuckenberg sp. n. In addition, the larva of *Afrothaumalea* is described for the first time. The phylogenetic relationships of *Afrothaumalea* with other thaumaleid genera are discussed.

INTRODUCTION

The Thaumaleidae is a little known family (about 150 species) of nematocerous Diptera, found in temperate regions. Immature stages are restricted to rocks covered by a thin layer of flowing water, known as hygropetric or madicolous habitats (Vaillant 1956; Sinclair & Marshall 1987). Habitats include rocky, cascading streams and creeks, springs, waterfalls, and seepages. Thaumaleids are apparently rarely collected, except by collectors specialising in madicolous habitats.

The first species of Thaumaleidae from the Afrotropical Region was described from a single female collected near the summit of the Drakensberg Escarpment in Natal, South Africa (Stuckenberg 1960). In the following year, the first male of *Afrothaumalea* was described from the Cape Province (Stuckenberg 1961). Despite the great distance between type localities, a second species was not named due to the limited number of specimens and difficulty of associating specimens of different sexes. The only additional specimen known is a second female, of minute size, collected in the Cape Province [Knysna, Diepwalle, 12–30.xii.1981, S. & J. Peck (CNC)]. Subsequent attempts to collect additional material were unsuccessful.

In early October 1994, the authors made a concerted effort to locate additional specimens in Natal. This search focused on the discovery of larvae, which helps direct collecting efforts to specific microhabitats (i.e., avoiding intermittent seeps). Concentrating collecting efforts on immature stages was also encouraged by Arnaud & Boussy (1994) and is outlined under 'Materials and Methods'. These latest efforts proved successful with the collection of a small series of larvae and a single male (considered *A. pamela*e Stuckenberg), from a small cascade in the Giant's Castle Reserve, Natal. Unfortunately, attempts to rear the larvae failed.

In this paper, the male of *A. pamela*e is described and the unnamed specimen of Stuckenberg (1961) is recognised as a different species and named. In addition, the larva of *Afrothaumalea* is described for the first time.

MATERIALS AND METHODS

Terms used for adult structures primarily follow those of McAlpine (1981). Homology of the male terminalia follows that of Sinclair (1992). The terms used for larval and pupal structures follow those of Peterson *et al.* (1989). Thoracic and abdominal larval chaetotaxy nomenclature (Figs 3–5), proposed in this study, is based on comparison and compatibility with several other thaumaleid genera. Larvae have been deposited in the Natal Museum and the Canadian National Insect Collection (Ottawa).

To facilitate observation, male terminalia and larvae were macerated in hot 85 % lactic acid. Label data of holotypes are cited in full, with original spelling, punctuation and date; lines are delimited by a slash mark (/), and a semicolon separates data quoted from different labels.

Larvae were collected by splashing water onto the rock substrate and flushing down organisms and debris into a white pan held below. Often madicolous habitats are in poorly lighted situations and both adults and larvae can be more easily observed if the collector blows gently on the wet rock surfaces. The air movement flutters the adult's wings or causes the larvae to adjust their position, thus revealing their location.

TAXONOMY

Afrothaumalea Stuckenberg, 1960

Afrothaumalea Stuckenberg, 1960: 107. Type-species *Afrothaumalea pamela* Stuckenberg by original designation.

Diagnosis: *Afrothaumalea* is distinguished readily from all other thaumaleid genera except *Niphta* Theischinger (1986), by having setae confined to the base of the first vein (= stem vein + basal section of $R + R_1 + R_{1+2}$) rather than extending along its entire length. The genus is distinguished from *Niphta* by lacking a prominent supralar ridge and costal setae are not reduced.

Males of *Afrothaumalea* are distinguished by the absence of apical gonostylar spines, by short paired gonocoxal blades, and the conical epandrium. Larvae of *Afrothaumalea* may be distinguished tentatively from other known genera by long thoracic and abdominal setae.

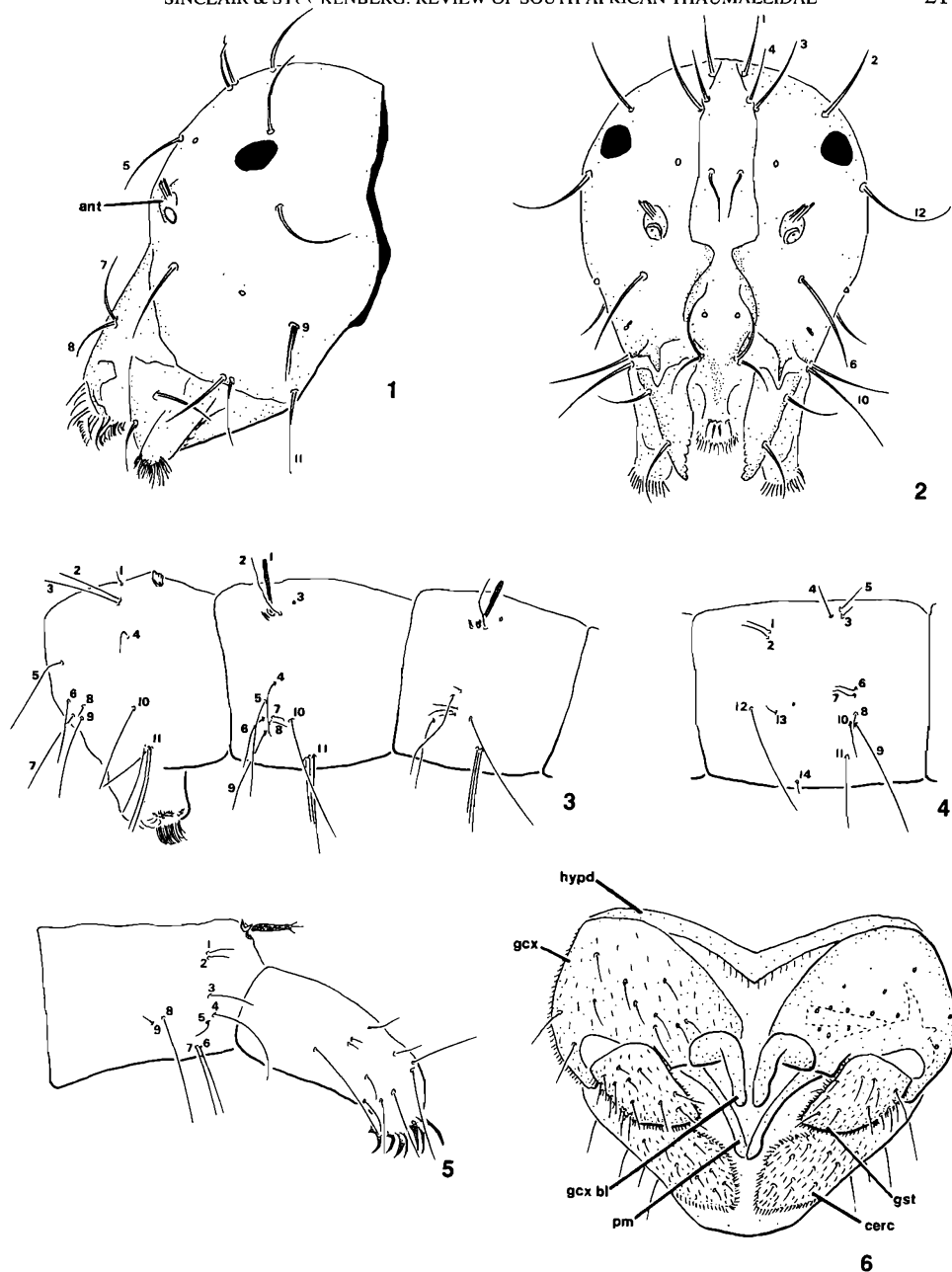
Afrothaumalea pamela Stuckenberg

Figs 1–6

Afrothaumalea pamela Stuckenberg, 1960: 108.

Holotype ♀ : SOUTH AFRICA: Natal: 'Cathedral Peak area / Natal Drakensberg'; 'Organ Pipes Pass / March 1959 / P.J. Stuckenberg [hand written]'; 'HOLOTYPE/ AFROTHAUMALEA/ PAMELAE/ STUCKENBERG ♀ [red label].' Only the body remains on the pin; the head, wing and a leg are mounted under three different coverslips on one slide, and the terminalia on a second slide. Both slides are appropriately annotated. In NMSA.

Recognition: This species is distinguished from *A. capensis* sp. n. by rectangularly shaped gonostyli and the gonocoxal blades having broad, rounded tips.



Figs 1–6. *Afrothaumalea pamela*. 1–5. Larva. 1–2. Head capsule. 1. Lateral view. 2. Anterior view. 3. Thoracic chaetotaxy. 4. Abdominal chaetotaxy. 5. Chaetotaxy of eighth abdominal and caudal segments. 6. Male terminalia, ventral view. [Abbreviations: ant = antenna; cerc = cercus; gcx = gonocoxite; gcx bl = gonocoxal blade; gst = gonostylus; hypd = hypandrium; pm = paramere. For explanation of numbers see text.]

Description (adult male):

Head dark brown; mesonotum and pleura greyish brown; abdomen somewhat darker,

halter pale. Legs light brown; posterior surface of hind tibiae matted by short setae; tarsomere 1 laterally compressed, posterior surface matted with short setae. Wings infusate, with clouding around edges of veins.

Abdomen: Sternites 3–7 rectangular, sparsely setose, anterior margin slightly more darkly pigmented; sternite 8 reduced to a slender, darkly pigmented sclerite.

Terminalia (Fig. 6): Epandrium broadly conical, posterior margin smooth; lacking pointed posterolateral processes. Hypandrium consists of slender band, with short medial elongation. Gonocoxites short, slightly longer than gonostyli; inner lateral margin lacking dense, slender setae. Gonostyli rectangular, gradually tapering to broad, round tip; tip lacking spines. Parameres smoothly arched, apex broadly rounded. Gonocoxal blades short, with broad rounded tips, projecting perpendicularly from posteromedial margin of gonocoxite.

Larva:

Head (Figs 1 & 2): Capsule orange-brown, with 2 large, circular eye spots. Antenna on low, truncate tubercle, consisting of terminal ring and 3 long, finger-like processes. Cone-like protuberances on head capsule lacking. Chaetotaxy: 12 pairs of simple, black setae; setae 9 and 10 consist of 2 pairs of slender setae.

Body (Figs 3–5): Thoracic setae simple, ventral setae long; mesonotum and metanotum with macroseta 1 blade-like, macroseta 2 long, slender. Setae of abdominal segments 1–8 simple, including dorsolateral setae. Transverse spiracular plate with 2 lateral, sclerotised finger-like procerci, apical setae apparently reduced to a few short setulae; conical lobe on either side of spiracular plate absent. Terminal segment bearing simple setae; lacking apical, dorsomedial lobe.

Material examined: SOUTH AFRICA: *Natal:* 1 ♂, 6 larvae, Drakensberg, Giant's Castle Reserve, 5.x.1994, B. J. Sinclair (NMSA, CNC).

***Afrothaumalea capensis* Sinclair & Stuckenberg sp. n.**

Afrothaumalea sp. Stuckenberg, 1961: 409.

Etymology: Refers to the type locality of this species.

Holotype ♂ (slide): SOUTH AFRICA: Cape: 'NATAL MUSEUM / Thaumaleidae / Afrothaumalea / sp. ♂ / Hermanus / Lund Expedition / Loc. No. 93 / see South African / Animal Life / No. E / Vol. 8 / pp. 409–412, 1961 [all data in capital letters; specimen mounted under 4 separate cover slips]'; 'HOLOTYPE / Afrothaumalea / capensis / Sinclair & Stuckenberg' (UZIL).

Recognition: This species is distinguished from *A. pamela* by a broad gonostylus, with lateral projection, and paramere with sculptured median margin.

Description: Refer to Stuckenberg (1961). In the original description the pair of pointed blades labelled *bs* are parameres, and the 'finger-like appendages' arising from the inner, posterior margin of the gonocoxites are gonocoxal blades. The gonocoxal blades in the slide preparation of the holotype are overlapping; this may be an artifact due to compression of the coverslip. The hypandrium (sternite 9) is the narrow, darkly stippled strip at the base (posterior) of the gonocoxites (Stuckenberg 1961, fig. 2).

DISCUSSION

The female holotype of *A. pamelae* was collected at about 2800 m, and was swept from vegetation fringing a vertical rock face continuously wetted by seepage. The male specimen and larvae of this species were collected at about 1500 m, and were aspirated or washed from a small cascading tributary of the Little Bushman's River (see Smith 1969, fig. 413). This stream flowed down to a walking trail and formed a small waterfall as it descended into the valley. The specimens were collected on the wet, vertical rock-face adjacent to the waterfall.

Stuckenberg (1960) first suggested that *Afrothaumalea* showed strong affinities with other genera restricted to the Southern Hemisphere. Results of a phylogenetic analysis of the generic relationships of the Thaumaleidae suggest that *Afrothaumalea* is most closely related to the Australian and southern Chilean genus *Niphta* on the basis of reduced setae on the first vein (Sinclair, in prep.). Unequivocal Gondwana elements are difficult to confirm in the South African insect fauna, but a few in Diptera are known: *Gondwanotrichomyia* Duckhouse (1980) in Psychodidae, *Atherimorpha* White (Nagatomi & Nagatomi 1990) in Rhagionidae, and *Homalocnemis* Philippi (Chvála 1991) in Empididae, are evident examples of South African Diptera related to temperate Neotropical and Australasian A-S clades.

Close affinities of *Afrothaumalea* with *Niphta* and *Austrothaumalea* Tonnoir is supported by the following larval characters: (a) long, finger-like larval antennal processes; (b) mesonotum and metanotum with blade-like macrosetae; (c) absence of conical lobes on either side of the posterior spiracular plate.

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